

CLAIMS

1. A method for producing a single crystal with pulling the single crystal from a raw material melt in a chamber by Czochralski method, wherein when growing the single crystal, where a pulling rate is defined as V (mm/min) and a temperature gradient of the crystal in the direction of pulling axis at the vicinity of solid-liquid interface is defined as G ($^{\circ}\text{C}/\text{mm}$) during growing a straight body of the single crystal, the temperature gradient G of the crystal is controlled by changing at least two or more of pulling conditions including a diameter of the straight body of the single crystal, a rotation rate of the single crystal during pulling the single crystal, a flow rate of an inert-gas introduced into the chamber, a position of a heater heating the raw material melt and a distance between a melt surface of the raw material melt and a heat insulating member provided in the chamber so as to oppose to the surface of the raw material melt, thereby V/G ($\text{mm}^2/^{\circ}\text{C} \cdot \text{min}$) which is a ratio of the pulling rate V and the temperature gradient G of the crystal is controlled so that a single crystal including a desired defect region is grown.

2. The method for producing a single crystal

according to Claim 1, wherein the single crystal is pulled with keeping the pulling rate V constant.

3. The method for producing a single crystal according to Claim 1 or Claim 2, wherein V/G is controlled so that the defect region of the single crystal to be grown is N region over a whole plane in a radial direction.

4. The method for producing a single crystal according to any one of Claims 1 - 3, wherein at least two or more of the pulling conditions are changed automatically according to changing conditions obtained by performing an experiment beforehand.

5. The method for producing a single crystal according to any one of Claims 1 - 4, wherein the changing conditions that change at least two or more of the pulling conditions are adjusted among batches for producing the single crystal.

6. The method for producing a single crystal according to any one of Claims 1 - 5, wherein a silicon single crystal is pulled as the single crystal.

7. A single crystal produced by any one of methods for producing a single crystal according to

Claims 1 - 6.